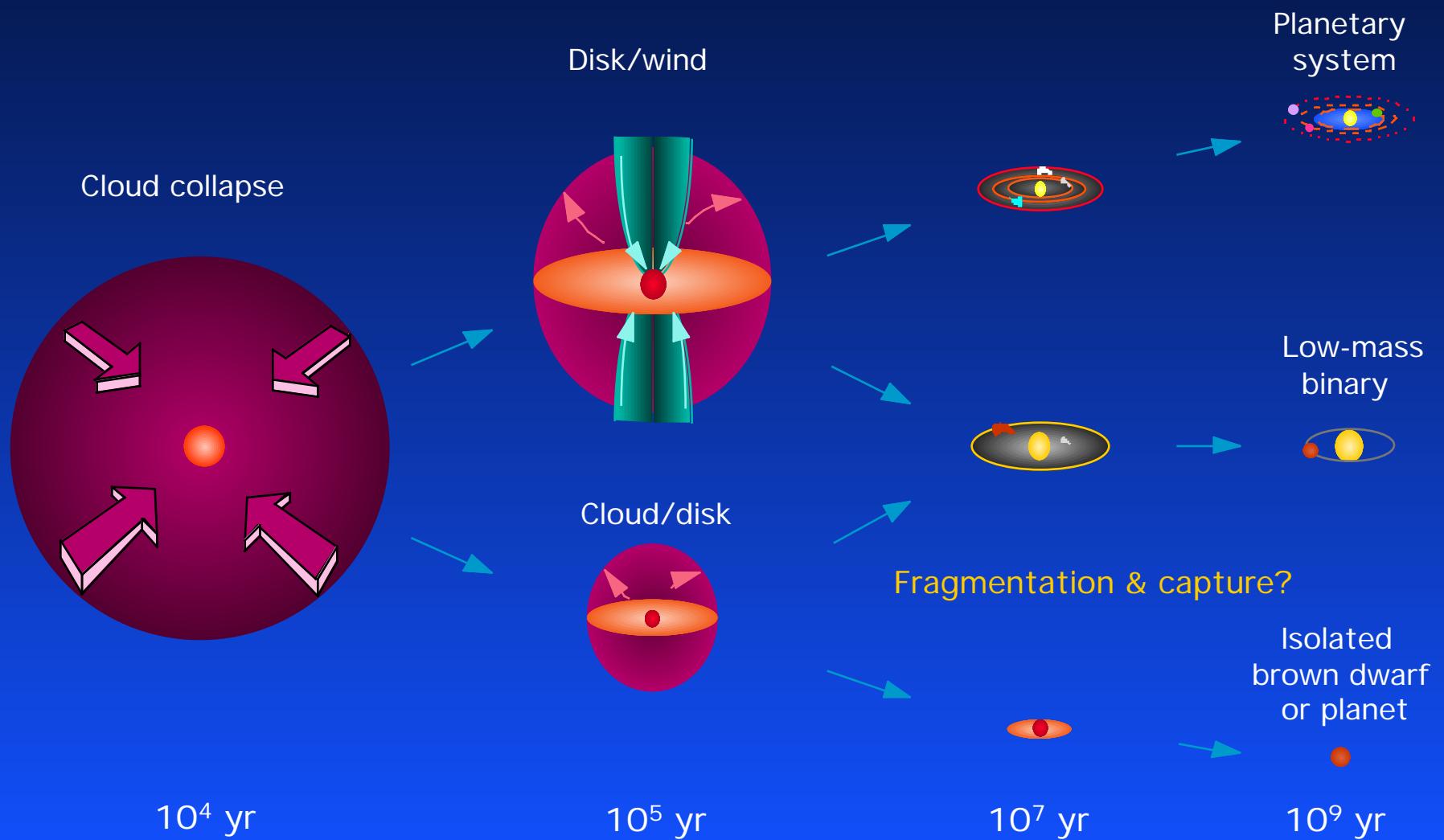
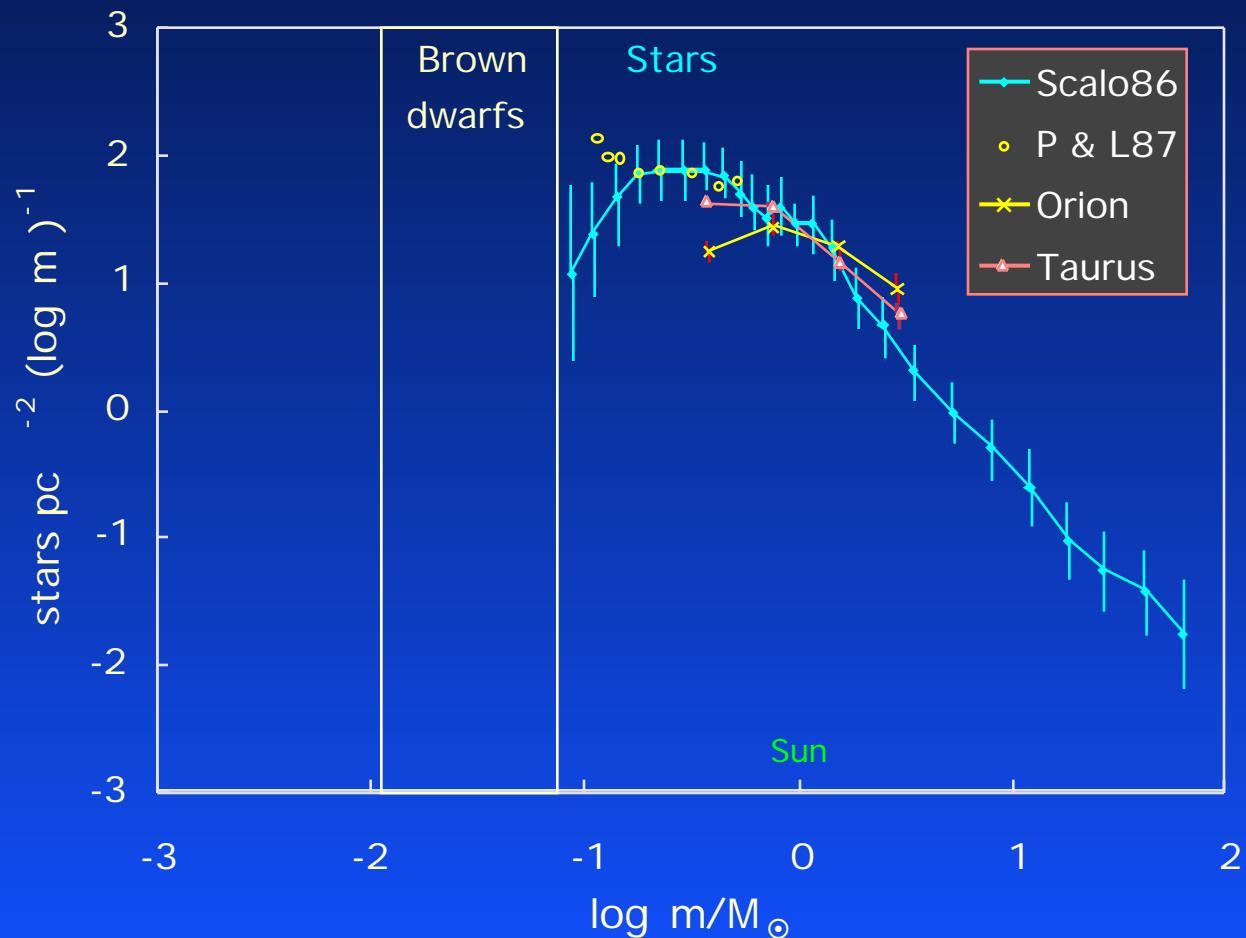


# Formation of Low Mass Objects

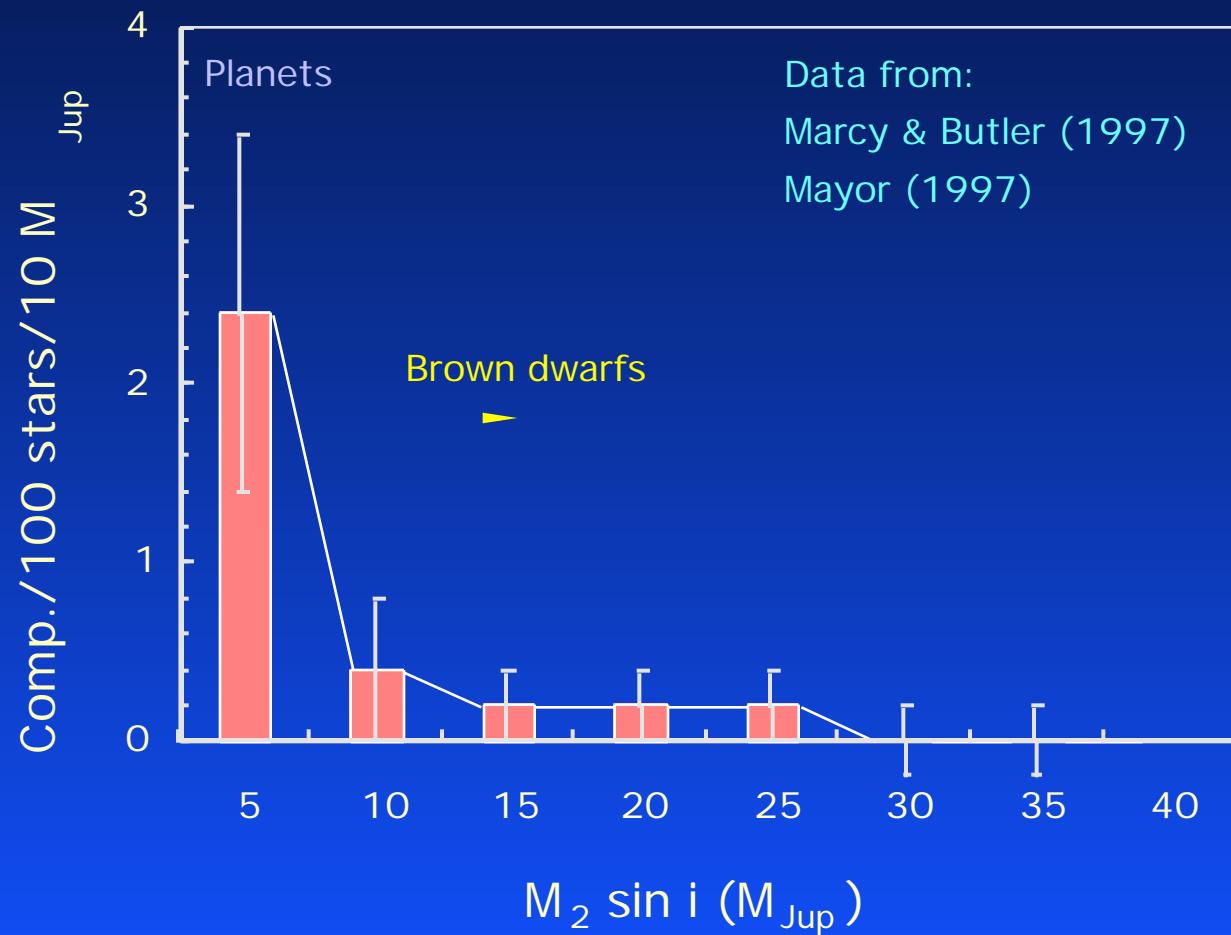


# Stellar IMF

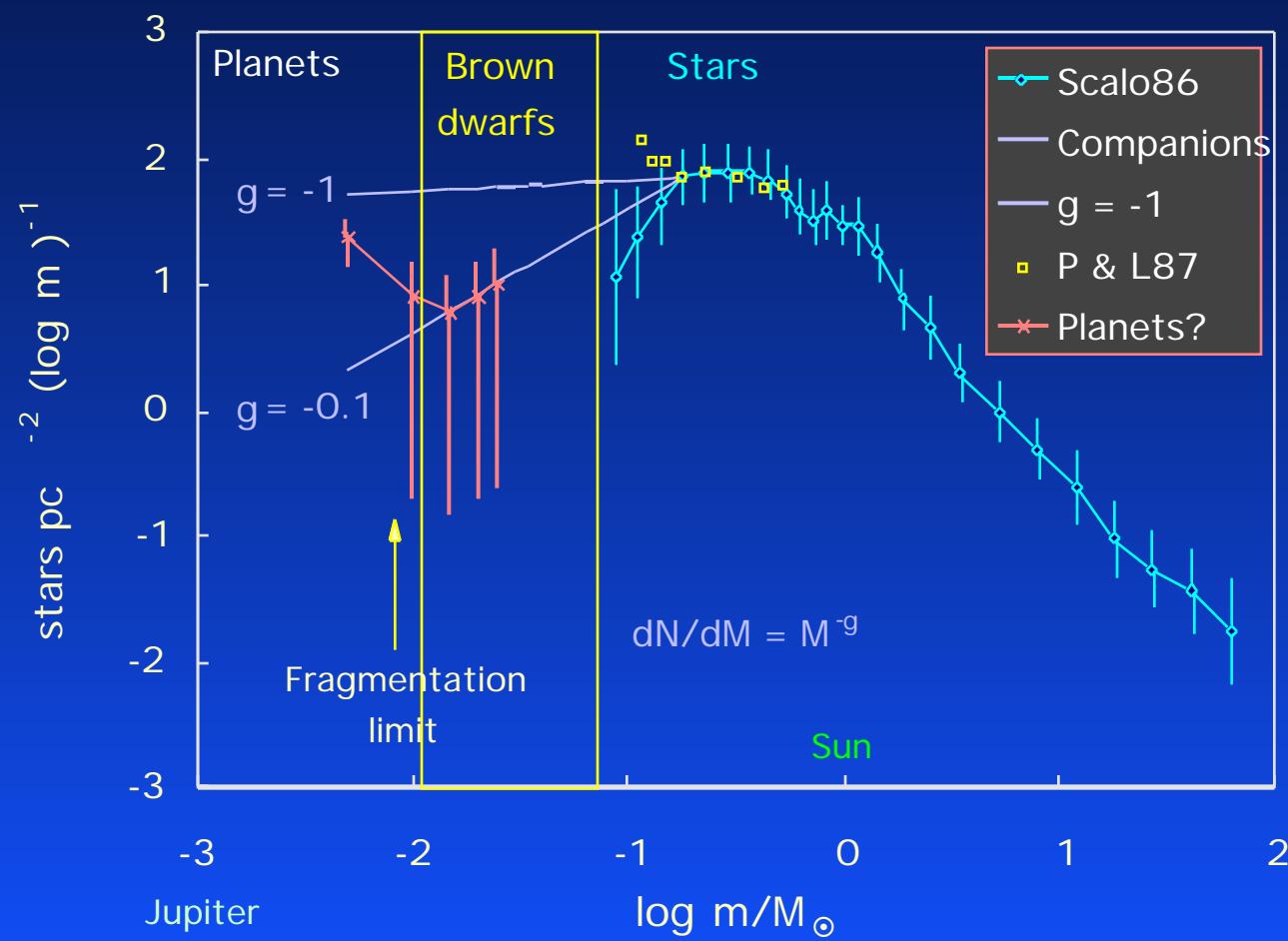


Scalo 1986,  
Fund. Cos. Phy., 11, 1  
Probst & Liebert 1987,  
ARA&A, 25, 473.

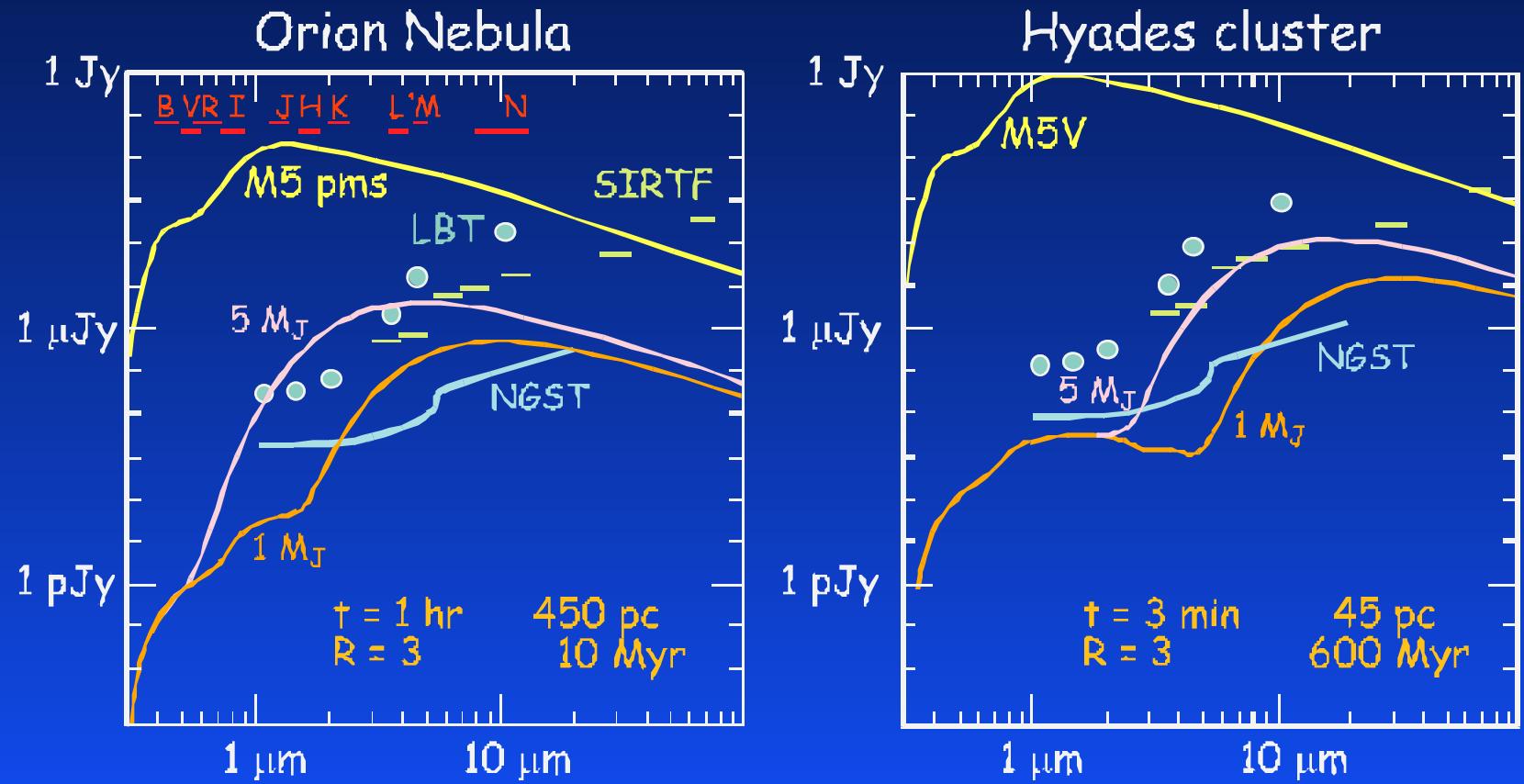
# Low-mass Companions



# “Complete” IMF



# Detecting Low-Mass Objects

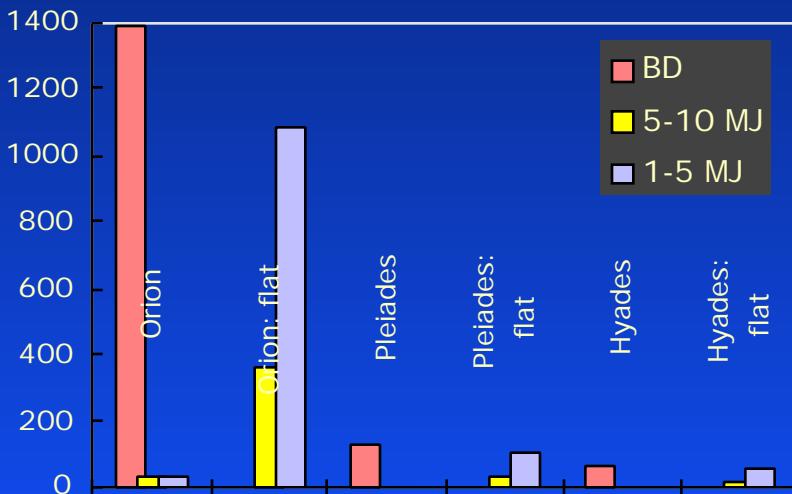


after Saumon et al. 1996, Ap.J., 460, 993.

# Surveys for Young Planets

Region	D (pc)	R <sub>obs</sub> (pc)	Myr	I (mm)	T (hr)	#FOV	Stars	BD	5-10 M <sub>J</sub>	1-5 M <sub>J</sub>
Orion	450	1.2		1	4	16	1600	1389	35	33
Orion: flat									360	1087
Pleiades	150	1.7	120	10	50	500	150	130	3	3
Pleiades: fl									34	102
Hyades	45	0.6	600	20	50	1000	75	65	1	1
Hyades: fl									17	51

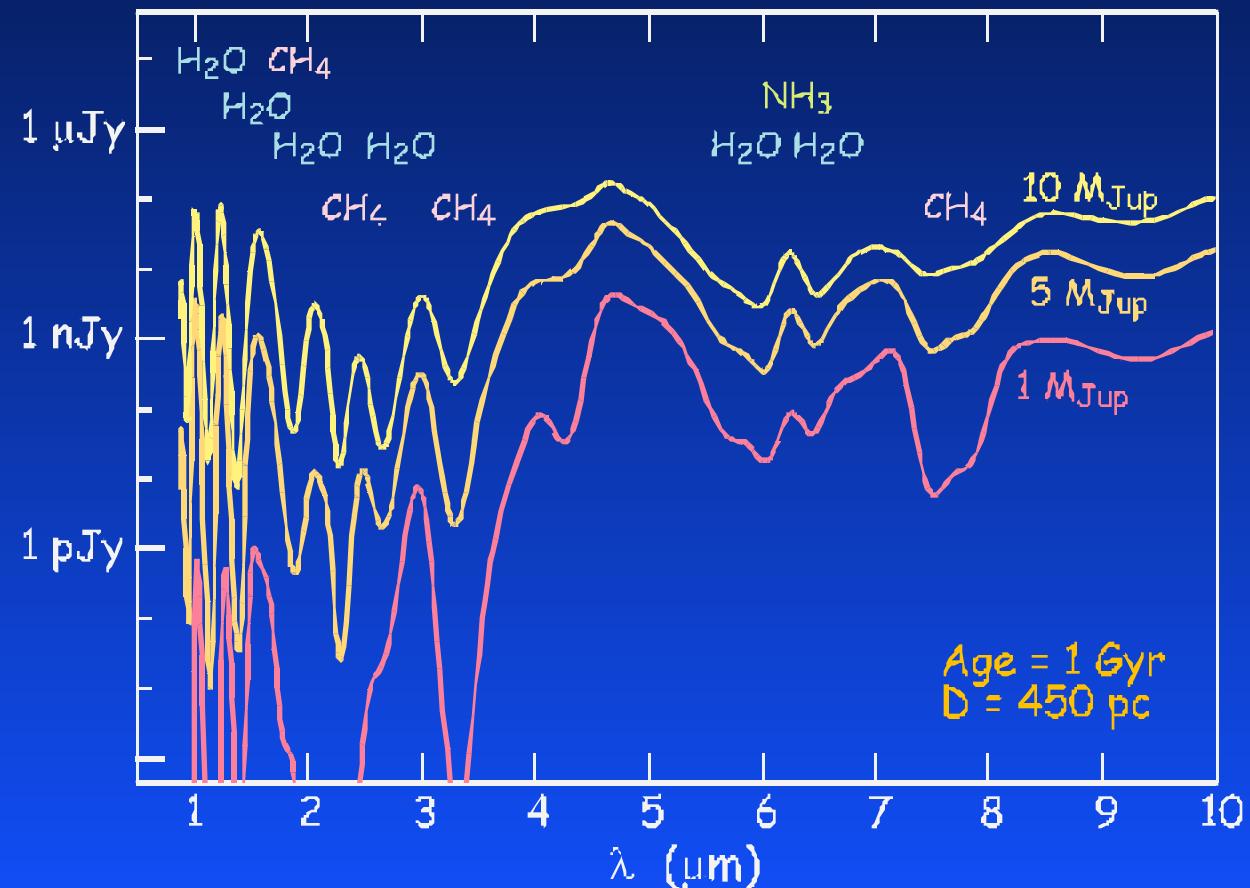
M/M <sub>Jup</sub>	I (mm)	10 <sup>6</sup> yr	I (mm)	10 <sup>9</sup> yr
		D(pc)		D(pc)
1	5	2500	20	50
2	5	3500	10	100
5	5	8900	10	270
10	5	32000	5	890



cluster input from Michael Meyer, MPIA

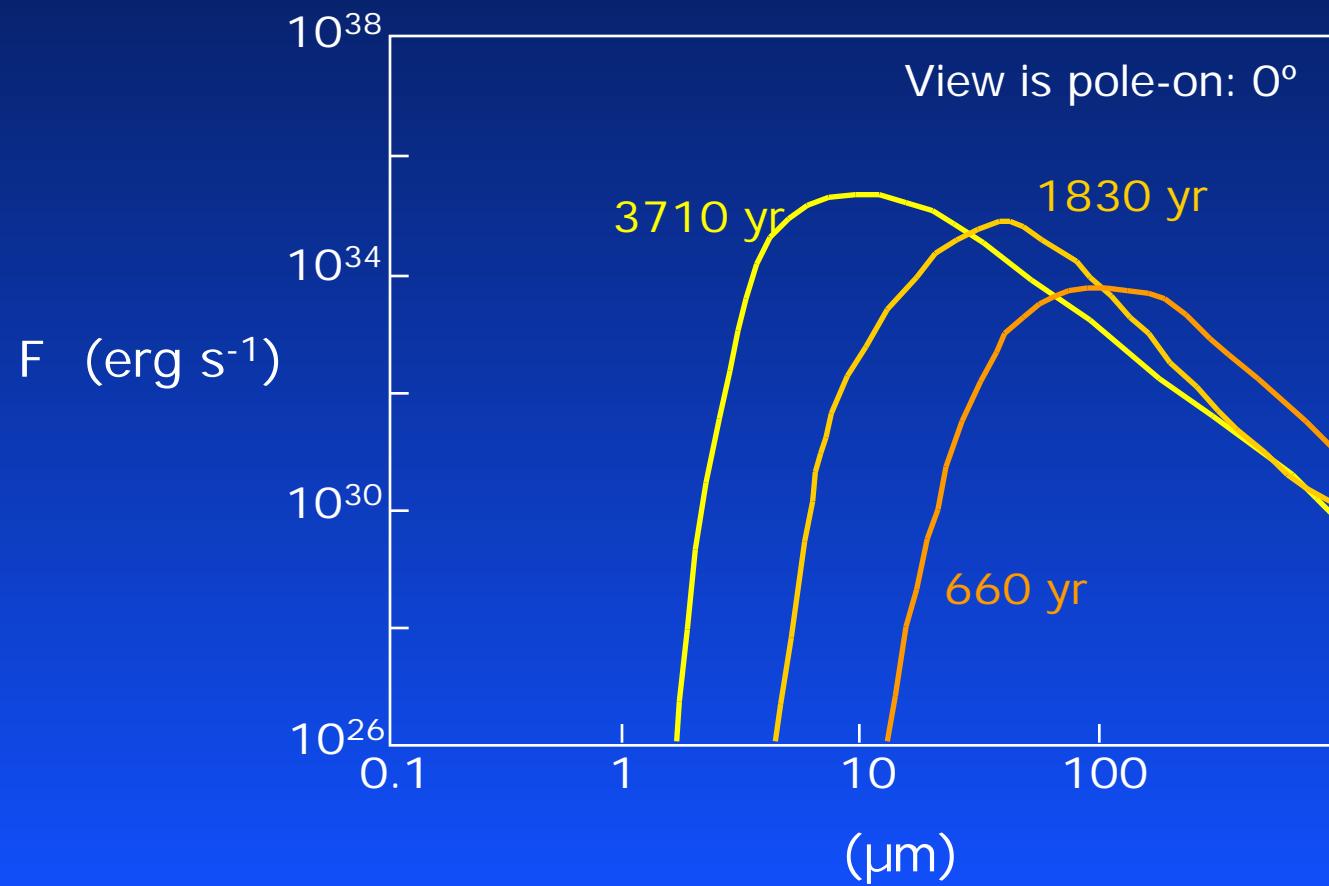
# Spectra of Giant Planets

from Adam Burrows 1997



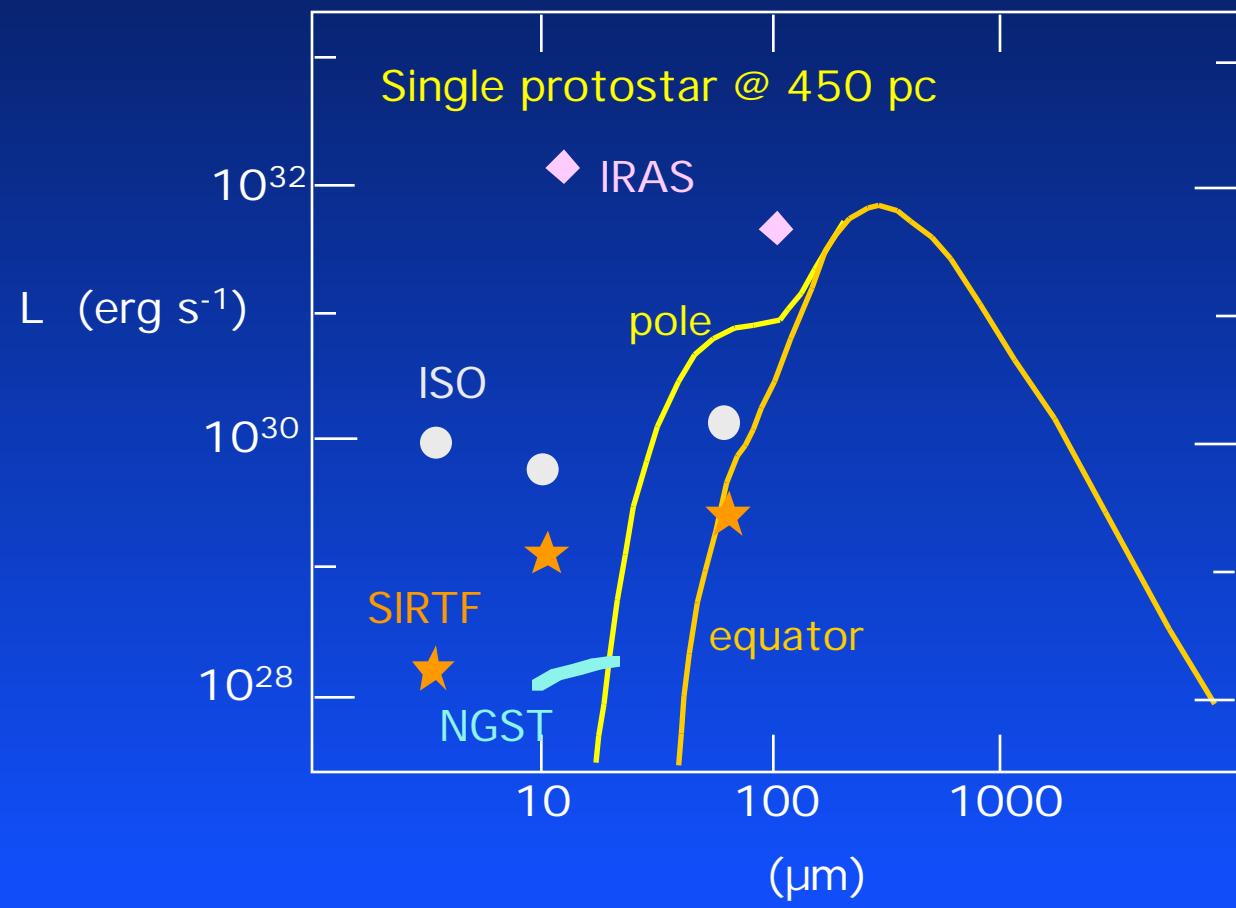
# Protostar Spectral Evolution

Yorke, Bodenheimer, & Laughlin 1995, Ap.J., 443, 199.



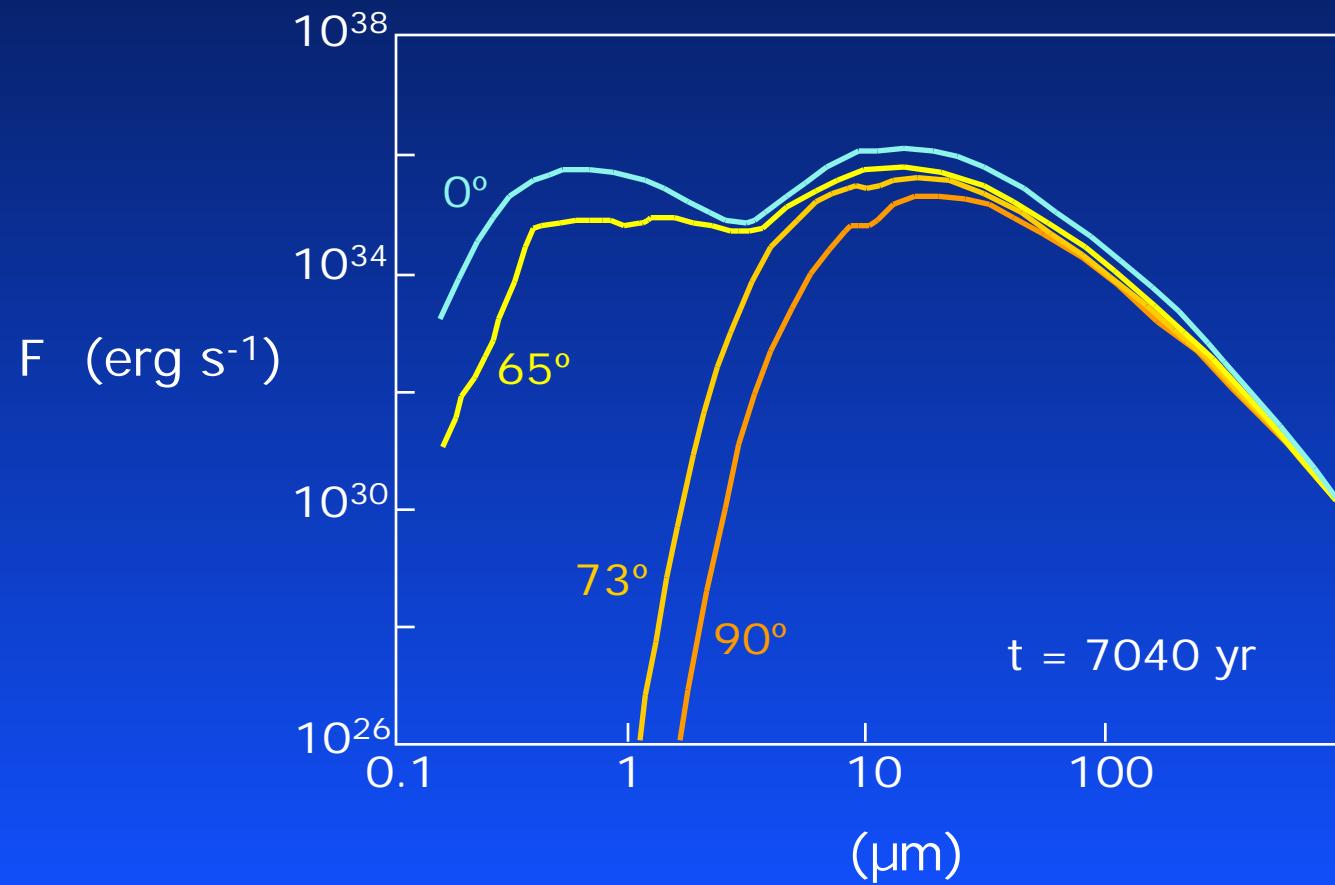
# Protostar Spectral Energy Dist.

Boss & Yorke 1995, Ap.J., 439 , L55



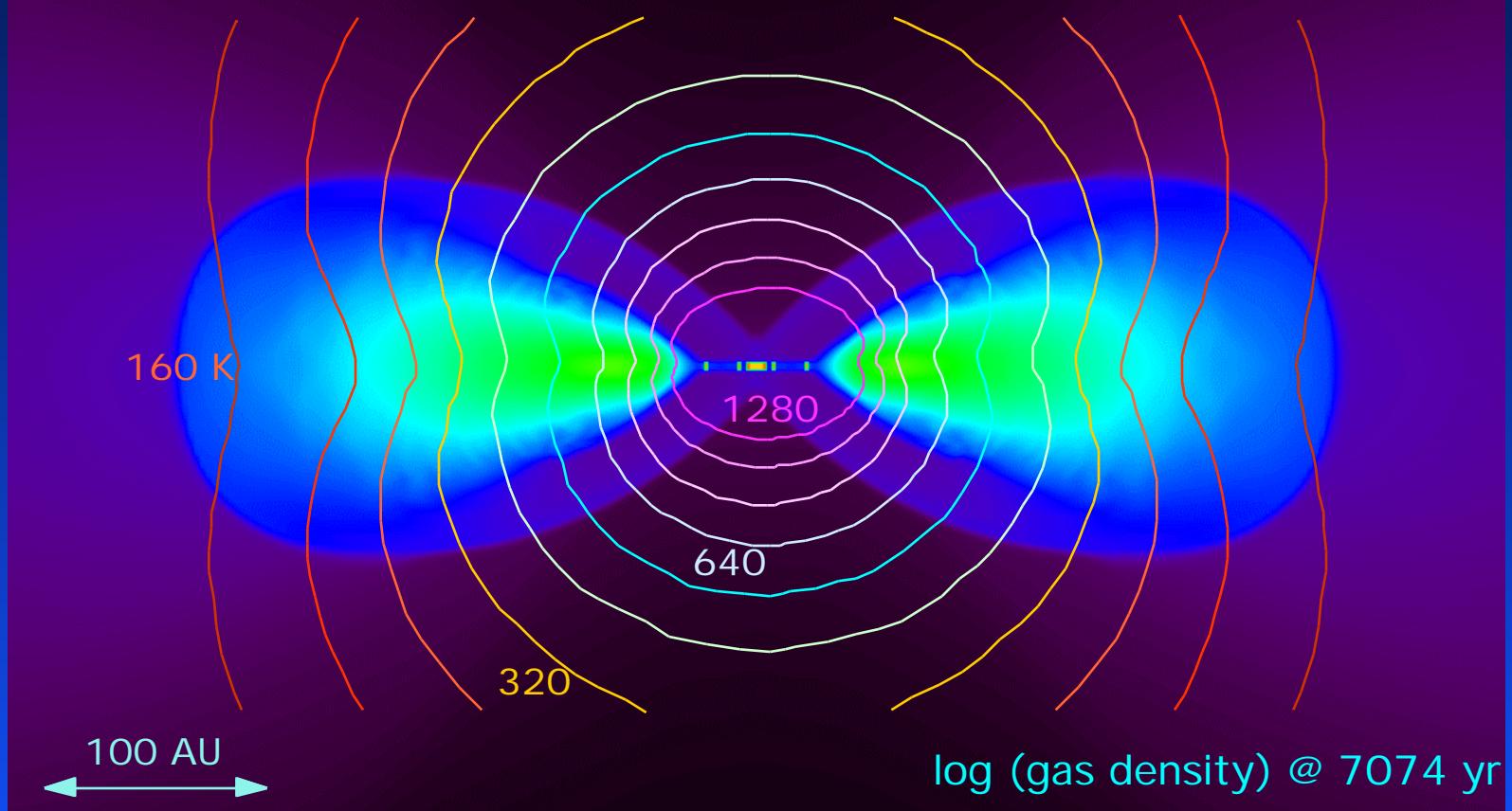
# Protostar Late Stages

Yorke, Bodenheimer, & Laughlin 1995, Ap.J., 443 , 199.



# Structure of Protostars

Yorke, Bodenheimer, & Laughlin 1995, Ap.J., 443 , 199, Fig. 4.

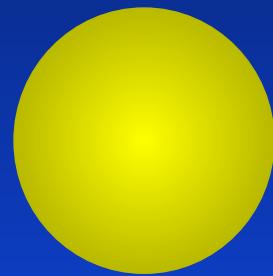


NGST resolution = 174 AU @ Orion  
= 58 AU @ Taurus

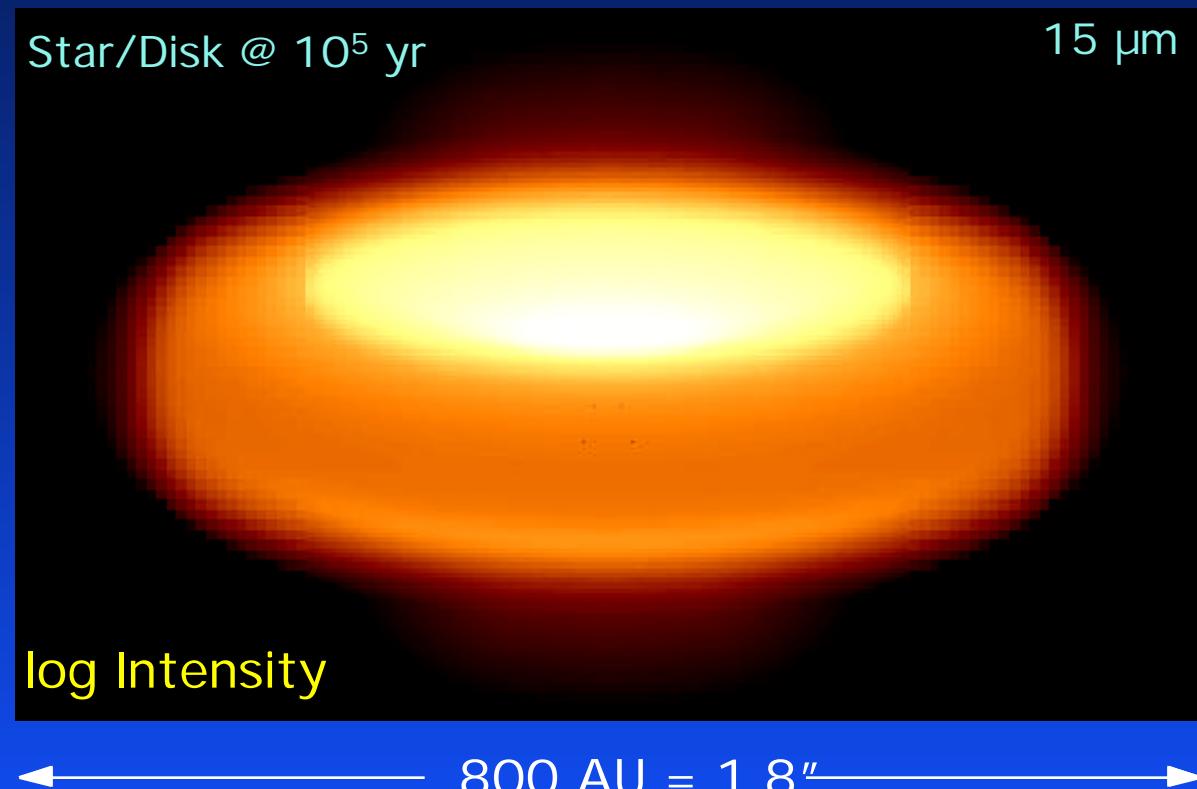
# Imaging Protostars

Yorke, Bodenheimer, & Laughlin 1995, Ap.J., 443, 199.

•  
Interferometer  
Keck<sup>2</sup>, VLTI

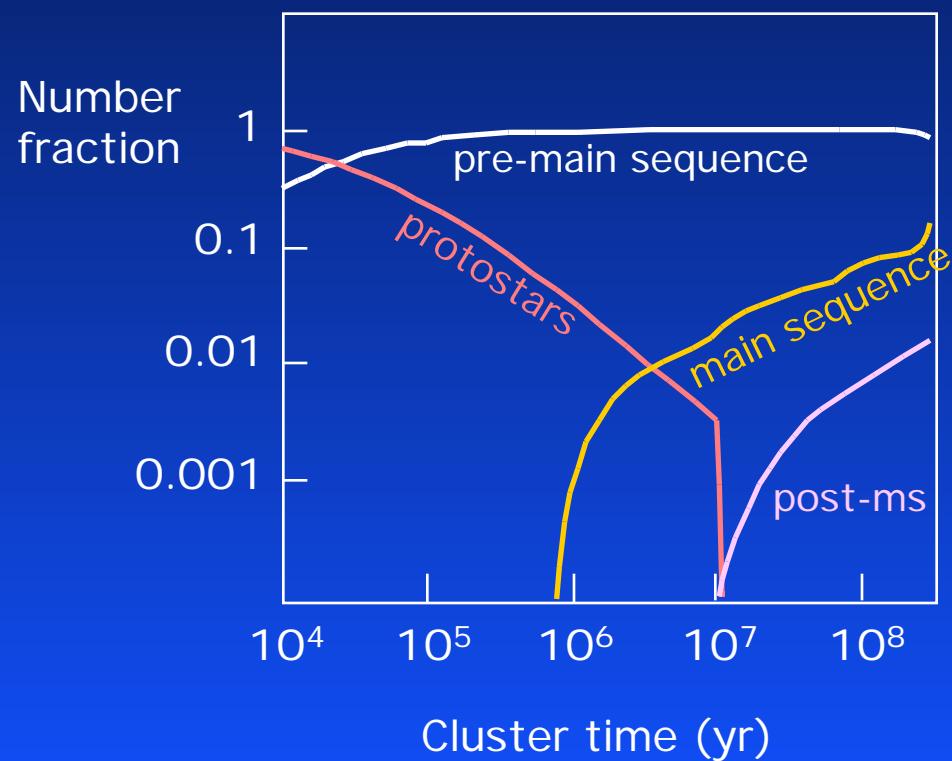


NGST FWHM  
resolution



# Protostars\* in Orion

from Fletcher & Stahler 1994, Ap.J., 435 , 329, using Scalo+companion IMFs



Assumes decreasing IMF ( $\alpha = 0$ )

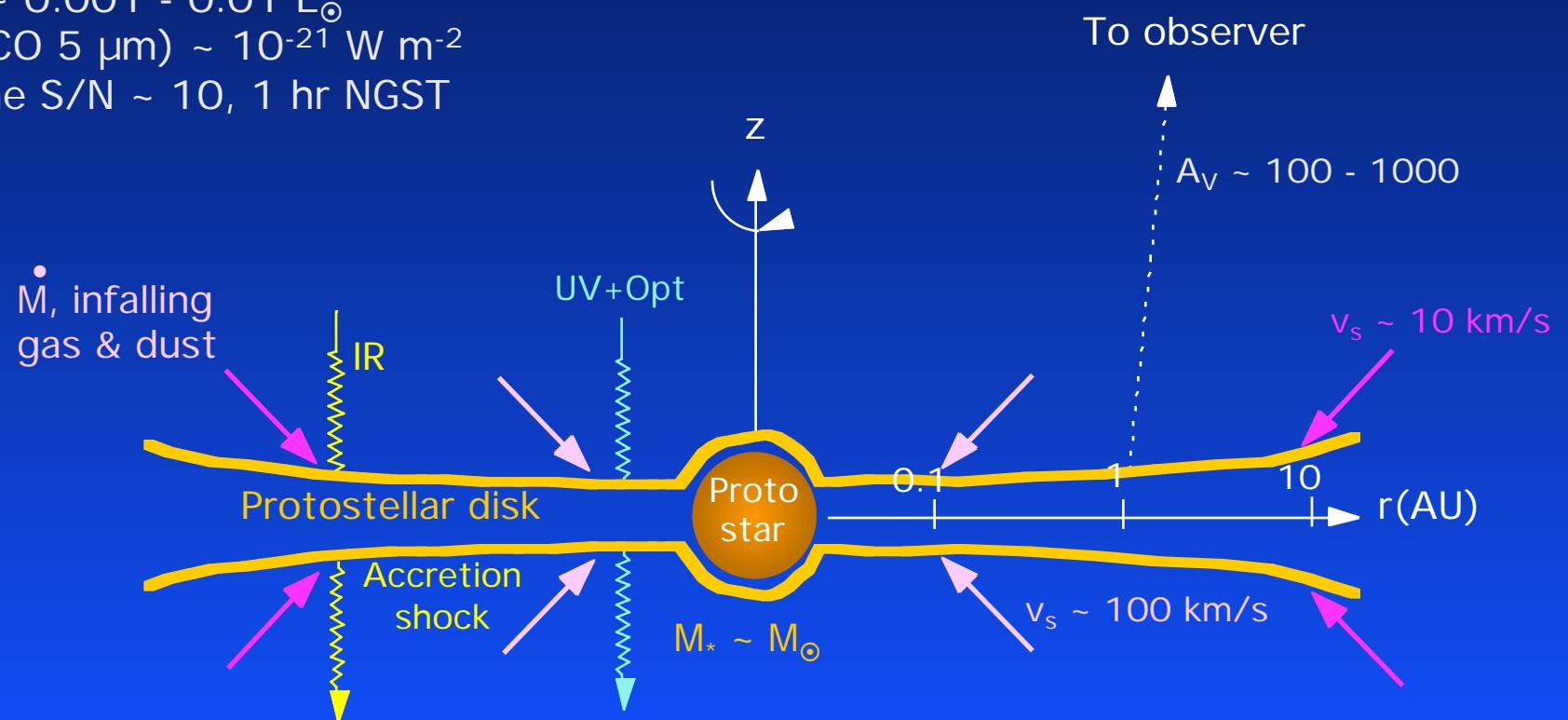
		1 Myr
Masses	#PMS	#Proto
1-5 MJ	65	2
5-10 MJ	70	2
BDs	2778	83
0.1-1 M <sub>⊙</sub>	2850	85
1-10 M <sub>⊙</sub>	348	10

\*Still accreting, enshrouded

# Protopstar Accretion Shocks

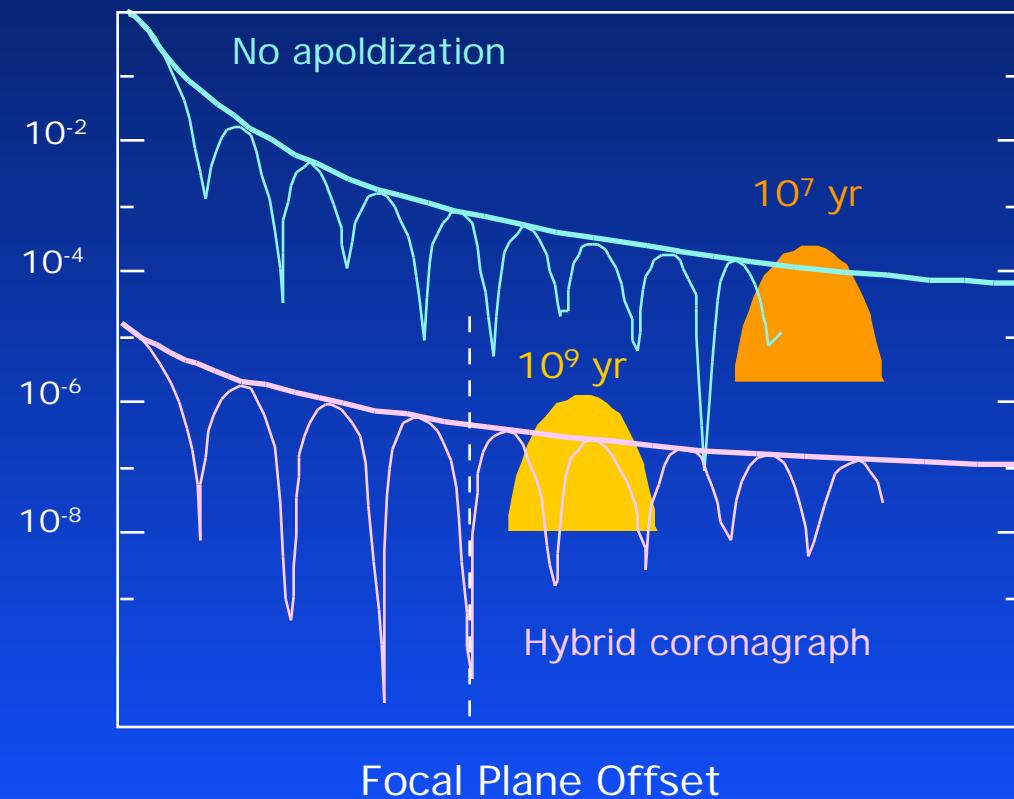
- accretion  $\sim 10^5$  yr
- luminosity  $\ll 100$  AU
- features 4 - 30  $\mu\text{m}$
- CO, H<sub>2</sub>O, OH coolants (< 10 AU)
- L  $\sim 0.001 - 0.01 L_\odot$
- F(CO 5  $\mu\text{m}$ )  $\sim 10^{-21} \text{ W m}^{-2}$
- Line S/N  $\sim 10$ , 1 hr NGST

Neufeld & Hollenbach 1994, Ap.J., 428, 170.



# Coronagraphic Imaging

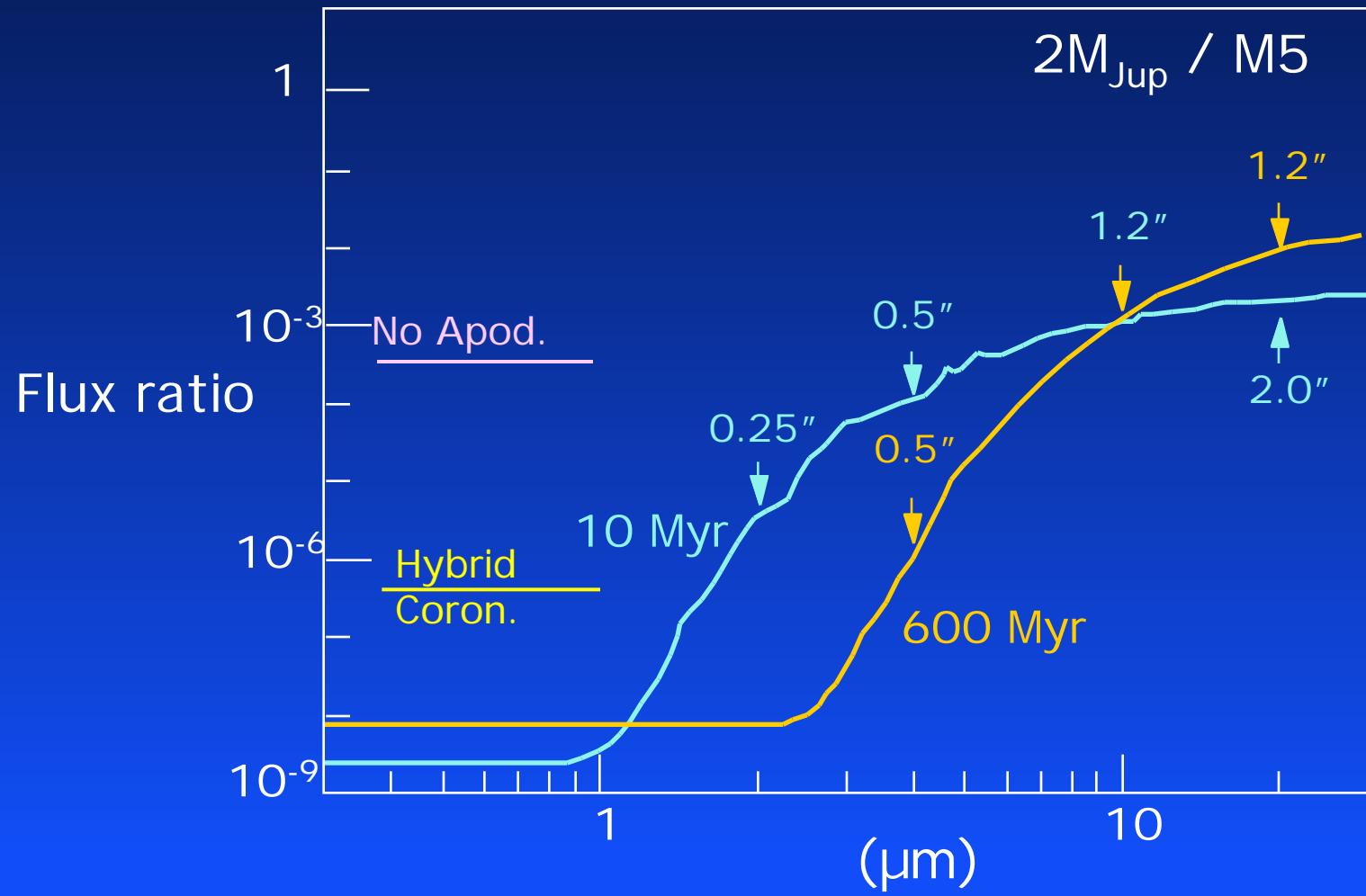
Relative Intensity



from NASA TOPS report  
(Burke et al. 1993)

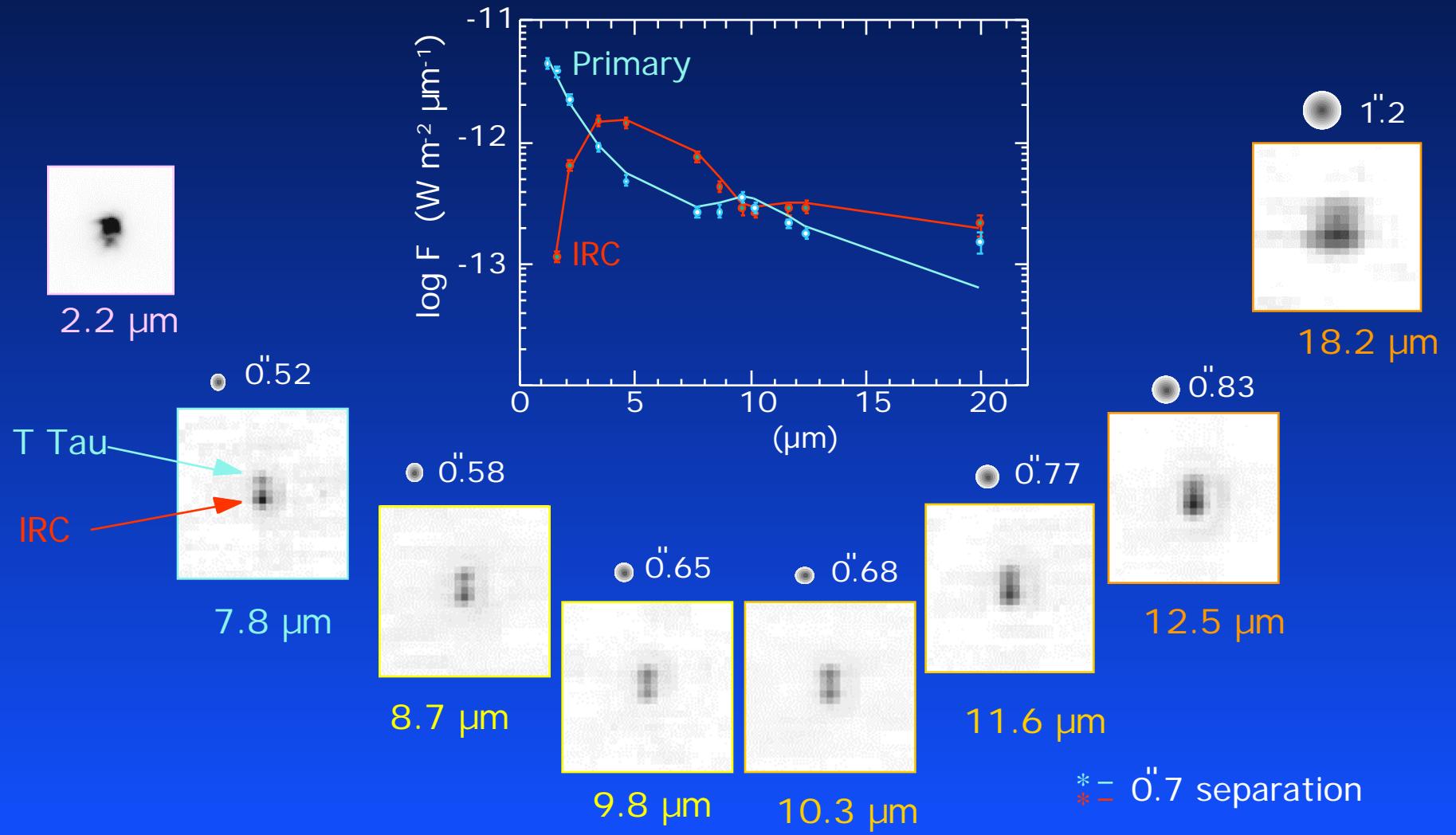
# Planet/Star Contrast

Saumon et al. 1996, Ap.J., 460, 993.

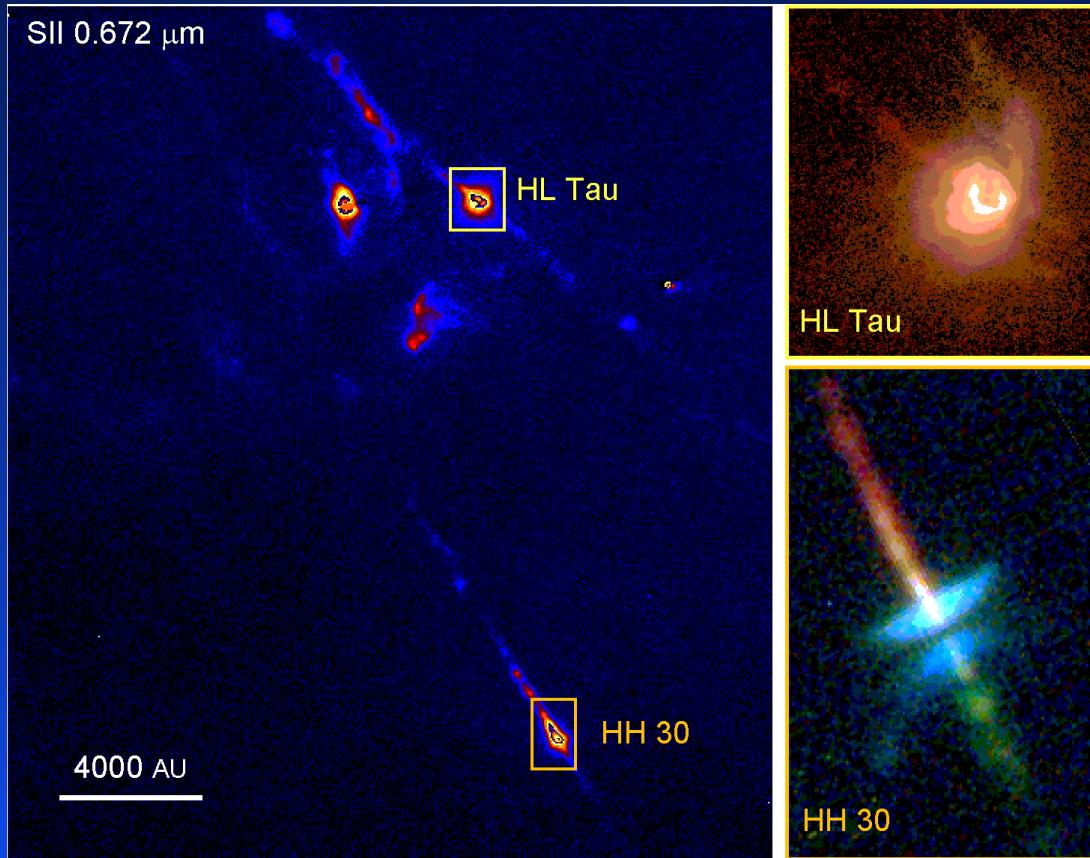


# Disks in Close Pairs: T Tau

Herbst, Robberto, & Beckwith 1997, AJ., in press.



# Imaging Jets

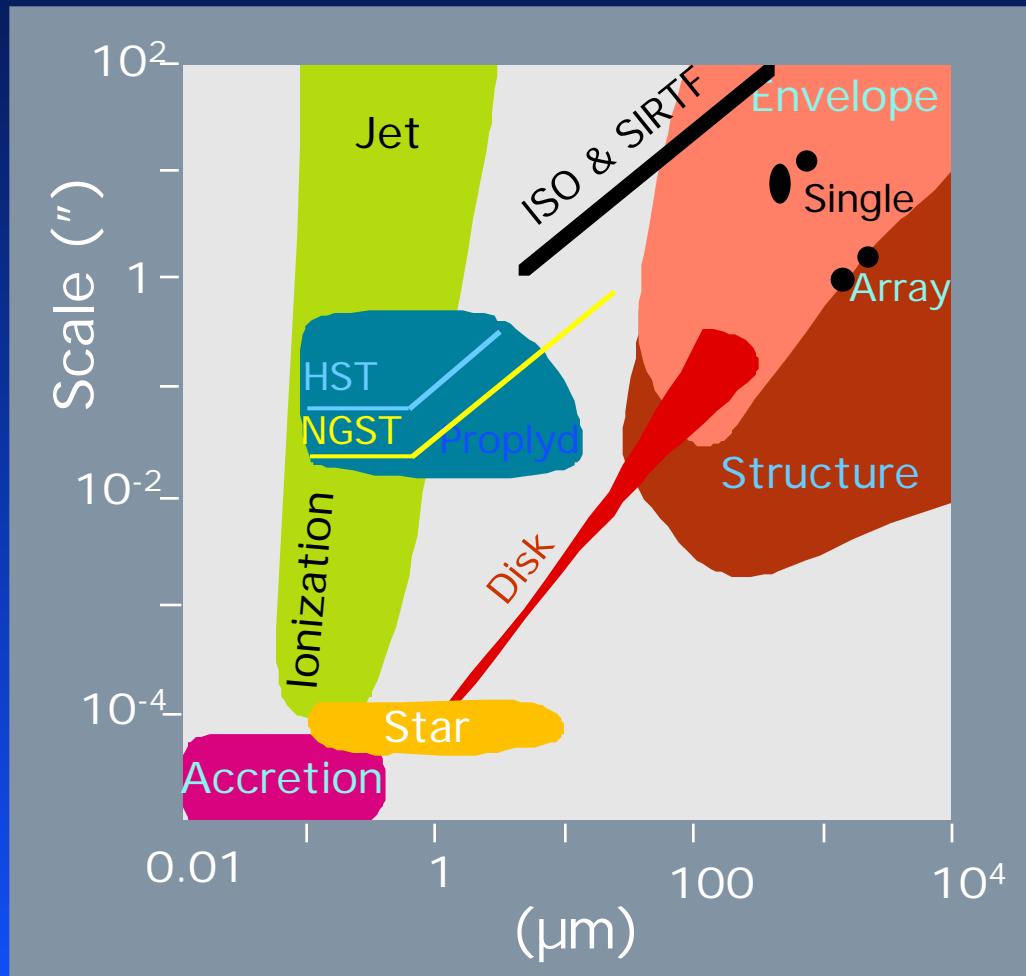


HST images from  
Ray et al. 1996,  
Ap.J., 468 . L103.

Mundt et al. 1990, AA, 232 , 37.

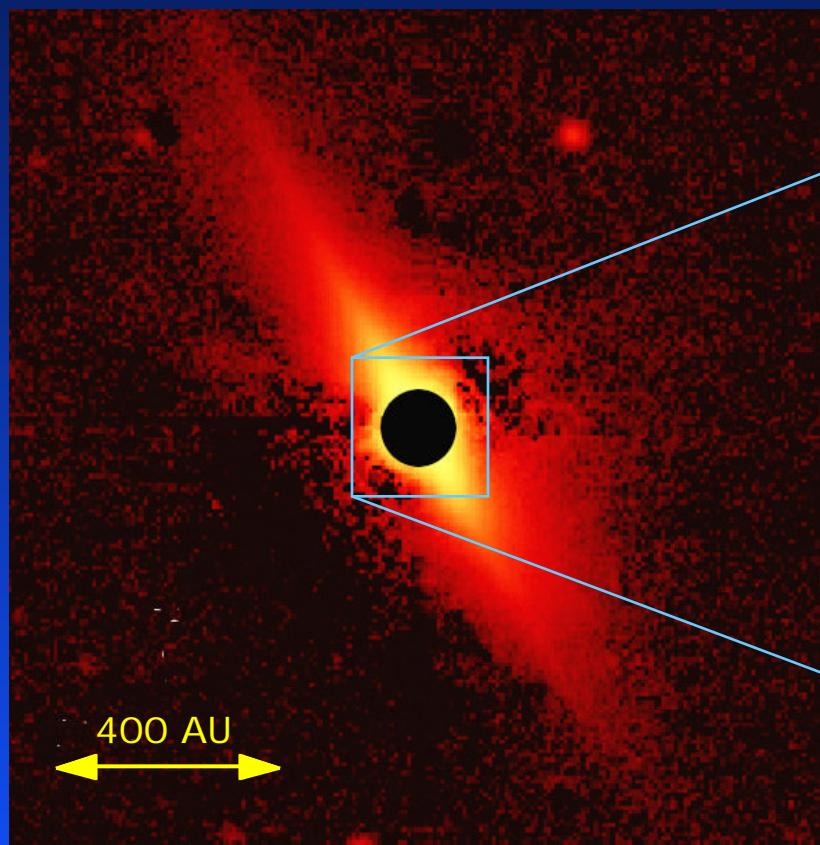
# Observability of YSO Environ

O'Dell & Beckwith 1997, Science, in press.

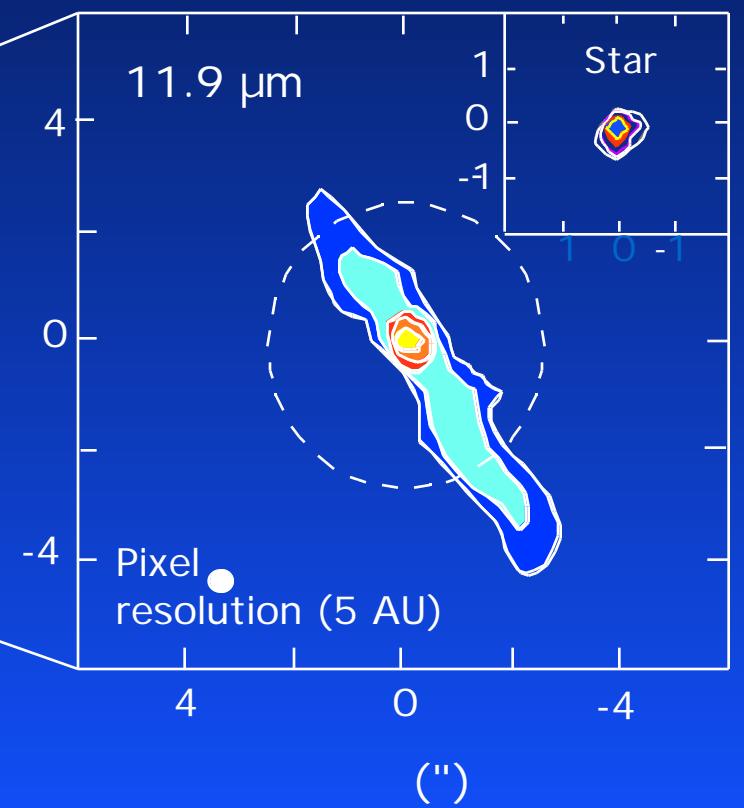


# Pictoris: Light Distribution

Kalas & Jewitt 1995, AJ, 110, 794.

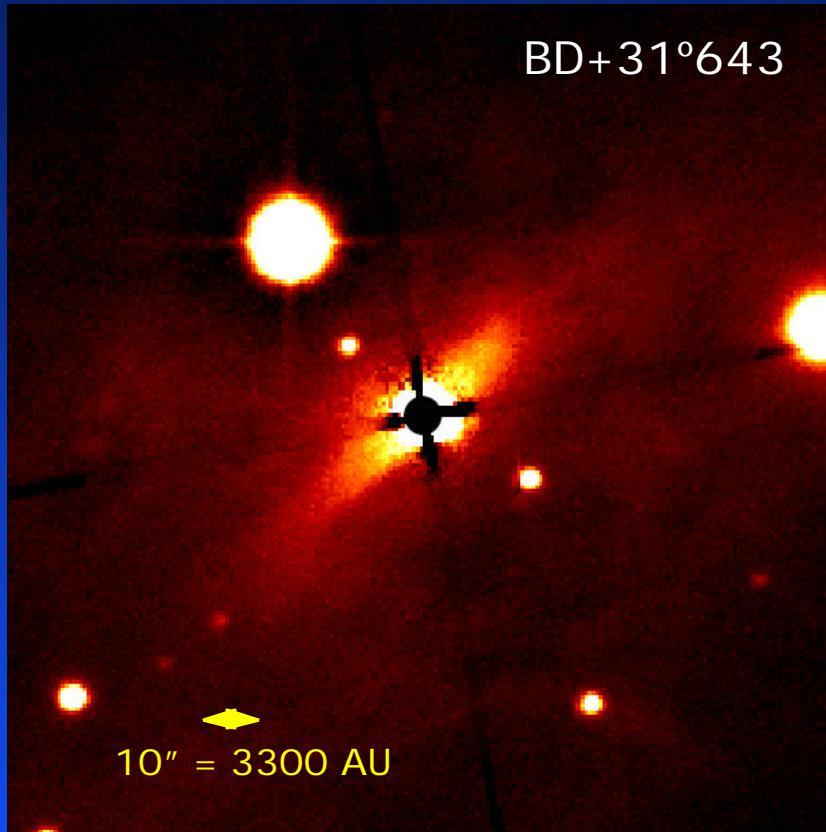


Lagage & Pantin 1994, Nature, 369 , 628.

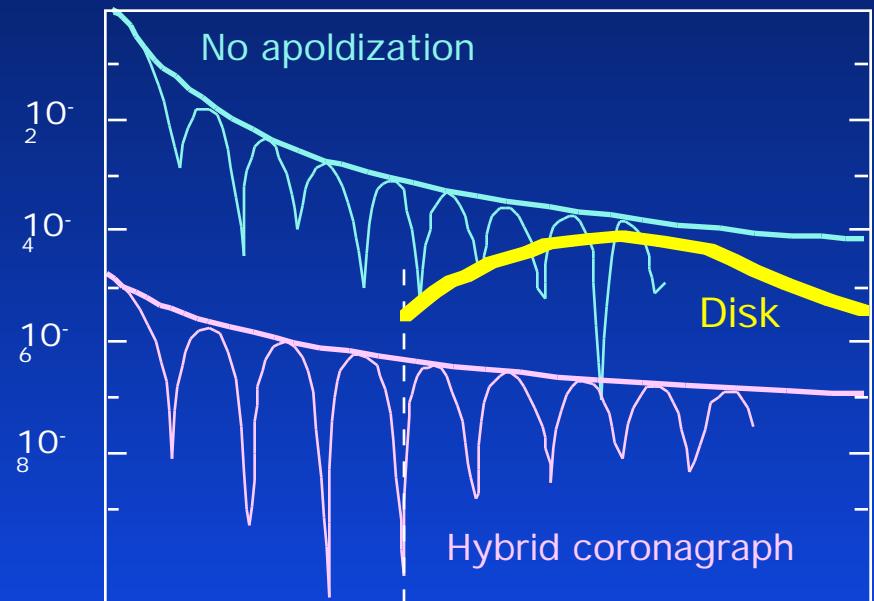


# Coronagraphic Imaging

Kalas & Jewitt 1997, Nature, 386, 52.



Relative Intensity



Focal Plane Offset

from NASA TOPS report  
(Burke et al. 1993)

# Imaging Young Disks



O'Dell & Wen 1992, Ap.J., 387 , 229; McCaughrean & O'Dell 1996, AJ, 108 , 1382.